

Nitrogen emissions

DBU-Funding information – Funding subject 9



Funding subject 9: Reduction of reactive nitrogen compound emissions in environmental compartments

While nitrogen is a central component of proteins, an essential part of all living organisms and the motor behind all organic growth, reactive nitrogen compounds result in complex environmental impacts such as groundwater contamination with nitrate, eutrophication, release of nitrous oxide and ammonia, and a reduction in biodiversity.

Exposure to reactive nitrogen compounds exceeds the safe range of planetary boundaries to a greater extent than any other environmental issue. Even though nitrogen is a crucial nutrient for living organisms, we need to avoid unwanted

release of nitrogen into the environment wherever possible. This has not yet been achieved. As a result, the nitrogen surplus caused by German agriculture amounts to around 100 kg per hectare of cultivated land per year.

There is a need for action to increase the efficiency of mineral and organic nitrogen fertilization and to reduce losses caused by reactive nitrogen compounds. This is only possible with a combination of measures that tackle all of the different sources of emissions.

In particular, the following measures are eligible:

- Development of technology and processes to improve animal welfare while at the same time preventing nitrogen losses in livestock facilities as well as during storage and application of manures
- Preventive approaches in the areas of protein supply, feed and feed technology with the aim of preventing nitrogen surpluses and nitrogen emissions
- Improvement of methods for the temporally- and spatially targeted application of fertilizer depending on plant requirements
- Measures for more efficient use of the nitrogen quantities already present in the soil
- Agricultural approaches to reducing nitrogen emissions in vegetable cultivation/commercial horticulture
- Recovery and recycling of reactive nitrogen from waste flows and during wastewater treatment
- Communication of the latest findings to specific target groups (livestock owners, farmers, water conservation consultants, etc.)
- Waste recycling or use of »new substrates« in the bio-economy



DBU-funding – competent and service-oriented

The Deutsche Bundesstiftung Umwelt (DBU) can look back on more than 25 years of funding. The foundation has a broad wealth of experience and professional expertise in various fields. In its work, the DBU can rely on a broad network of experts working as honorary consultants.

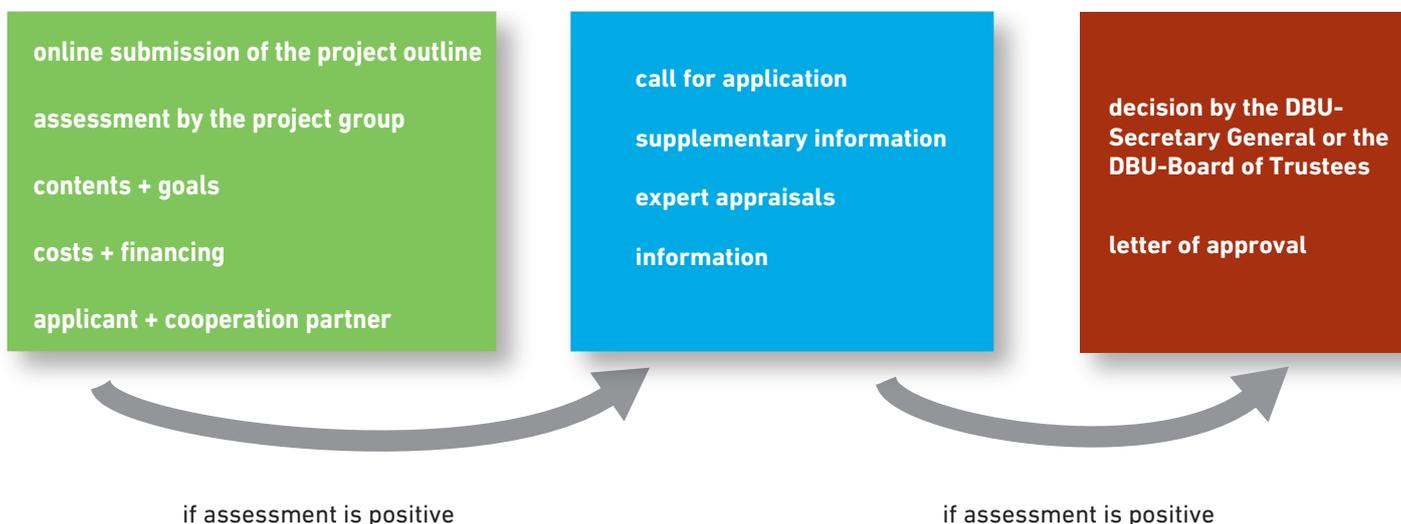
The DBU is independent and neutral from any political party. When submitting an application, only the technical quality and the innovative content of the application are important. The DBU offers its applicants competent, result-oriented advice and individual support by a highly qualified, interdisciplinary team. The internal

assessment of the projects and the external evaluation lead to a further development and qualification of the project proposal.

The DBU accompanies project partners from the project outline to implementation and provides support in finance and expertise.

DBU-partners of particularly successful projects are also supported in the dissemination of their project results by appropriate communication measures (trade fairs, exhibitions, events, publications, press work).

From outline to funding



First steps in a project outline

The DBU is interested in receiving innovative, exemplary project ideas that contribute to the reduction of nitrogen emissions in agriculture.

When preparing your project outline, please consider the following questions:

- Does the project idea fit the support subject?
- Does the project involve at least one or more solution approaches?

If this is the case, the following criteria have to be considered when preparing a successful project outline:

- The objectives of the project outline are directly related to the support subject.
- The methods, processes or products developed go beyond the current state of the art/knowledge or develop it further.
- The project produces the expectation of a concrete contribution to the solution for the problem described.

- The innovation and the environmental relief effects are presented convincingly.
- The solution approach can be applied to similar problems in an exemplary manner.
- The special unique selling point of the project in terms of technical significance and/or innovation is named.
- The results of the project will be communicated to the public and relevant experts in a target-group-specific manner.
- The project offers approaches for related education and qualification.

If these criteria apply, interdisciplinary and systemic project approaches are of particular importance to the DBU.

You can submit your detailed project outline online www.dbu.de/antragstellung

Exemplary DBU-funded projects

The following projects show an excerpt from the thematic range of funding subject 9 and specify the implementation in the fields of action mentioned on page 1. Further information on the projects can be found at www.dbu.de

Demand-oriented fertilizing (AZ 33143)

One approach to solving the problems of water protection and greenhouse gas emissions in agriculture is demand-oriented fertilizer planning. Support is being provided for the development of a novel, camera-based, light-line-supported multispectral sensor technology, including the model-based derivation of a nitrogen fertilizer recommendation in real time. Using the example of winter wheat as a model crop, innovative sensor technology is used to simultaneously detect and quantify nitrogen deficiency, water shortage and leaf diseases. A special feature of this technology is the areal camera image, realized for the first time. Based on these data, the amount of fertilizer to be applied is calculated by means of a model, taking into account the available biomass, the supply status of the plant and other stress factors, such as disease infestation or drought, and adapting them to the resulting yield potential accordingly.



Targeted and low-loss fertilization (AZ 31086)

The aim of this project was to increase nitrogen efficiency through new processes for the application of organic and mineral fertilizers (slurry-strip-till process and injection fertilization) and reduced soil tillage. The idea behind it: A low-loss fertilizer application improves the utilization of mineral- or liquid manure nitrogen by the plant, so that nitrogen emissions are reduced. The project results show that emissions of ammonia and nitrous oxide after organic- and mineral nitrogen fertilization can be reduced by deep application, addition of nitrification inhibitors as a fertilizer additive, by application in appropriate weather conditions, and by fertilization well adapted in time and quantity to the growth-related plant requirements. The slurry-strip-till process was thus confirmed as a nitrogen-efficient process. The use of injection fertilizer was recommended in order to avoid the leaching of nitrate even in years with higher precipitation and thus a greater risk of leaching.

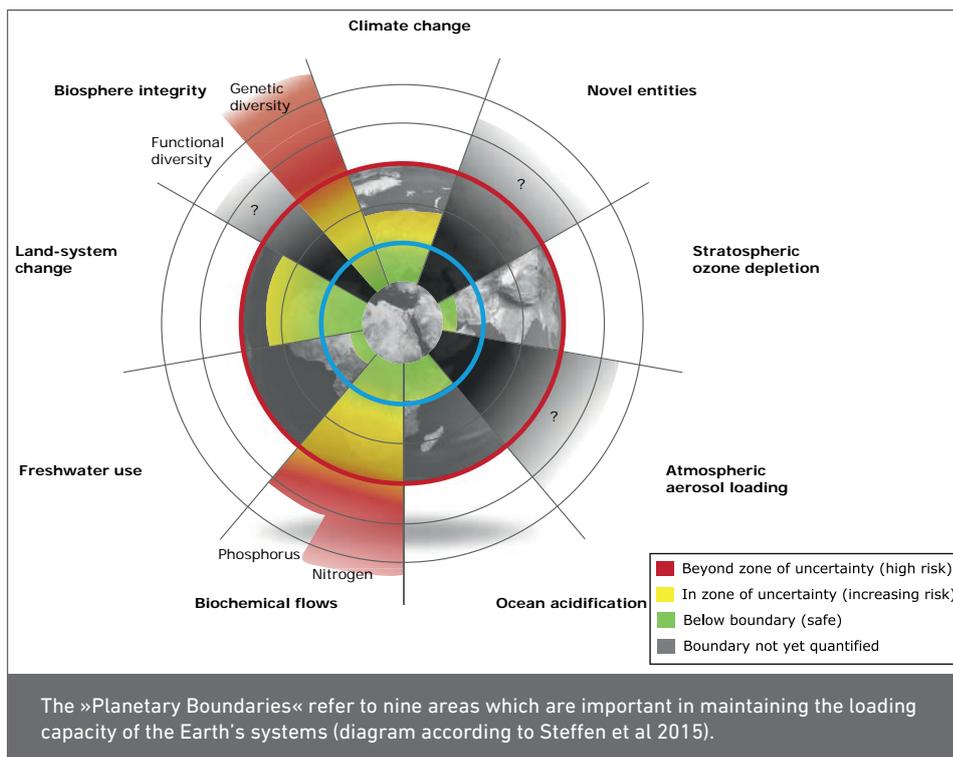
Application technology and nitrogen emissions (AZ 30364)

In this project, technical fertilization methods for injecting slurry into the soil were further developed into a holistic »underground fertilization« strategy for the use of farm fertilizers. The ribbon-like slurry application should provide an equivalent substitute for the common mineral under-foot fertilization. The use of mineral fertilizers in maize cultivation was reduced - with additional positive effects on the nutrient balance. In addition, the use of nitrification inhibitors in the liquid manure depot was investigated: If liquid manure was introduced directly into the soil - by under-foot fertilization for row crops - it was possible to reduce the release of ammonia by up to 90 percent. To date, however, this technique has hardly been used in practice. The project results show that the optimization of agricultural application technology has a great leverage effect for the reduction of nitrogen emissions. The cooperation with the official consultancy service and field trials located in relevant maize growing areas promote the rapid transfer of knowledge to practical operations.



DBU – We promote innovations

The Deutsche Bundesstiftung Umwelt (DBU) supports innovative, exemplary and solution-oriented projects for the protection of the environment in accordance with the foundation's mission statement, with special consideration for the mid-sized business sphere. Funded projects should achieve sustainable effects in practice, provide impulses, and have a multiplier effect. It is important to the DBU to contribute, in particular, to solving current environmental problems which result from unsustainable economic practices and ways of life in our society. The DBU sees key challenges above all in climate change, biodiversity loss, the unsustainable use of resources, and harmful emissions. The funding subjects thus tie in with both current scientific findings on »planetary boundaries« and with the Sustainable Development Goals adopted by the UN. Especially with regard to biological diversity (biosphere integrity) and the disruption of the nutrient cycles of nitrogen and phosphorus (biochemical flows), the planetary boundaries have been far exceeded. Humanity has therefore moved a long way from any safe operating space, and is now exposed to a high risk of negative ecological, economic and social consequences. Mankind has also already moved into the danger zone in terms of land-system change and climate change.



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